In the Claims

This listing of claims will replace all prior versions and listings of claims in the application:

1. (Previously presented) An apparatus for measuring speaker cone displacement relative to a fixed position in an audio speaker having a voice coil aligned with the speaker cone along a central axis, the apparatus comprising:

(a) a variable reluctance sensor device; said sensor device including a first unit fixed relative to said fixed position; and a second unit affixed to said speaker cone effecting relative motion between said first unit and said second unit through motion of said speaker cone at a position on said cone, said first unit and said second unit disposed coaxially about an axis radially offset from said central axis;

(b) a signal injecting circuit coupled for injecting a predetermined input signal into one of said first and second units; and

(c) a signal receiving circuit coupled with said one of said first and second units for receiving a signal resulting from modulation of said input signal due to variation of reluctance of said sensor device caused by displacement of said first unit relative to said second unit, and for generating an indicating signal based upon said resulting signal; at least one signal characteristic of said indicating signal being related with said cone displacement.

2. (Previously Presented) The apparatus of Claim 1, wherein said first unit comprises a core structure; and wherein said second unit comprises a electromagnetic coil structure.

3. (Previously Presented) The apparatus of Claim 1 wherein

said second unit is affixed to said speaker cone at a substantially stationary node of any modal vibration of said speaker cone.

4. (Previously Presented) The apparatus of Claim 3, wherein said second unit is mounted on said cone using a wedge.

5 to 6. (Cancelled)

7. (Previously Presented) The apparatus of Claim 1, wherein said first unit comprises an electromagnetic coil structure; and wherein said second unit comprises a core structure.

8. (Previously Presented) An apparatus for measuring speaker cone displacement relative to a fixed position in an audio speaker having a voice coil aligned with the speaker cone along an axis, the apparatus comprising:

(a) a variable reluctance sensor device; said sensor device including a magnetic coil structure fixed relative to said fixed position; and a core structure affixed to said speaker cone effecting relative motion between said first unit and said second movement through motion of said speaker cone at a position on said cone radially offset from said axis; wherein said electromagnetic coil structure operates as at least part of a high pass filter having a corner frequency;

(b) a signal injecting circuit coupled for injecting a predetermined input signal into one of said first and second units; said predetermined input signal has a frequency substantially below said corner frequency; and

(c) a signal receiving circuit coupled with said one of said first and second units for receiving a signal resulting from modulation of said input signal due to variation of reluctance of said sensor device caused by displacement of said first unit

relative to said second unit, and for generating an indicating signal based upon said resulting signal; at least one signal characteristic of said indicating signal being related with said cone displacement.

9 to 20. (Cancelled)

21. (Previously Presented) An apparatus for measuring speaker cone displacement relative to a fixed position in an audio speaker having a voice coil aligned with the speaker cone along an axis, the apparatus comprising:

(a) a variable reluctance sensor device; said sensor device including a core structure fixed relative to said fixed position; and a magnetic coil structure affixed to said speaker cone effecting relative motion between said first unit and said second movement through motion of said speaker cone at a position on said cone radially offset from said axis; wherein said electromagnetic coil structure operates as at least part of a high pass filter having a corner frequency;

(b) a signal injecting circuit coupled for injecting a predetermined input signal into one of said first and second units; said predetermined input signal has a frequency substantially below said corner frequency; and

(c) a signal receiving circuit coupled with said one of said first and second units for receiving a signal resulting from modulation of said input signal due to variation of reluctance of said sensor device caused by displacement of said first unit relative to said second unit, and for generating an indicating signal based upon said resulting signal; at least one signal characteristic of said indicating signal being related with said cone displacement.